

Management-audit of process-oriented enterprises: problems and methodology

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Abstract

Authors elements of management-audit scientific and methodical apparatus of process-oriented enterprises based on controlling rules of selection, composition and visual (graphic) representation of the business process system using process modelling language TML are presented.

Keywords: management-audit, process-oriented management, business engineering.

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1. Introduction

Problem statement. Monographies and periodicals on audit mainly cover aspects of economic entities audit in terms of their financial statements credibility. Authors believe that management auditing issues should be covered taking into account trends of modern enterprises transition to process-oriented management systems. Nowadays this trend more often determines enterprises competitiveness in terms of their interaction with the external business environment. Regarding this, searching methods of structural and component management-audit of enterprise business process systems becomes relevant based on main system-forming organizational system principles compliance.

2. Main body

Latest sources and publications research. Large scope of publications ^[1-5] is dedicated to manage-

ment-audit methods substantiation. Source analysis demonstrates that the dominant interpretation of the «management-audit» term as a rule is mostly expressed as conformity assessment of separate enterprise divisions activity and entire enterprise to set criteria, which are formal requirements, for example ISO 9001 standards requirements to quality management systems (QMS) of process-oriented enterprises. Herewith, within declared by this standard process-oriented paradigm of enterprise management system organization process functioning performance indicators and their conformity to certain controlling rules of selection, composing and following demonstration are not considered. Authors should mention that researchers mainly pay attention only to methods of auditing information collection. Though, a small number of researches are dedicated to process management-audit. Publications ^[1-5], in particular offer an approach to process deviations from regulation rate assessment, which is based on expert evaluation according to a particular

point scale. Nevertheless, the authors propose an assessment system, not considering non-conformity localization in the business process of the management system. So, the non-conformity rate assessment problem is not solved. Still, decision making procedure according to management-audit is a heuristic process based on experience, intuition and expert opinion. As a result, similar non-conformities are evaluated differently by auditors based on their rate and auditing results also differ.

Unsolved part of the general problem. Current standard ISO 9001 includes set of requirements to internal audits planning of quality management system (QMS):

« – plan, develop and support audit program(s) including frequency, methods of responsibility, planning requirements and reports, which should take into account importance of processes chosen for audit, changes influencing enterprise and previous audit results;

– for each audit criteria and area should be determined;

– auditors choice and audit conduct should be provided with objective and impartiality of the auditing process».

In total, those requirements to planning and conduct of internal audits are capable of ensuring compliance with requirements set by the standard and successful certification. On the other hand, authors suppose that the «departments activity»

auditing organization method carries increased risk to fail compliance with requirements of the standard «on establishing the effectiveness of the quality management system», as obtained data characterize state of separate departments activities, that means fragments of management system activity. Therefore, reliable conclusions on the system in total are impossible based on such data.

Thus, summing up the above the conclusion is that if the enterprise is satisfied with formal existing of QMS according to ISO 9001 standard requirements as instrument for efficiency (perfection) of management system on «minimum certification» level, then planning and conduct of «departments activity» management system audits may be acceptable. If the enterprise is interested in receiving accurate data concerning management system functioning, then a business process system audit based on scientifically reasonable methods can ensure achievement of such goals almost without alternative. Functioning paradigm of the QMS should be grounded on methods based on exactly determined procedure of controlling selection, composing and visual (graphic) representation rules of management and technological business process system on all levels of management process pyramid on the enterprise for this purpose ^[6] subject to basic system-forming principles of organizational system theory. So, a dilemma arises in providing business process system audit versus enterprise divisions audit. Advantages and disadvantages of each assessed auditing method are compared in Table 1.

Management-audit method	Assessment criteria	
	Value of audit results for management	Audit complexity rate
Business process audit	High. Allows collecting facts for reasonable decisions concerning process and management systems in total improvement.	Rather high. Requires assiduous preliminary actions concerning complete database on business model of enterprise business process system in visual (graphic) form, allowing immediate violations (deviations) of business process detection. Such database creation requires high costs.

Table 1. Management-audit methods assessment

<p>Divisions activity audit</p>	<p>Low. Allows receiving fragmentary data useful for making decisions concerning local improvements (taking risk of management system integrity failure). In total such an approach is unfavorable for transition from structural and functional management to process-oriented in current business environment.</p>	<p>Significantly simpler. Requires no prior identification (selection, composing and description) of business process system and binding to organizational structure. Organization and coordination of audit is simplified. This management-audit method is recommended when cost shortening for audit planning and conduct is required.</p>
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Table 1. Management-audit methods assessment (Continuation)

Research goal consists of new elements of the authors scientific and methodical apparatus for management-audit of process-oriented enterprises representation based on controlling selection, composing and visual (graphic) representation rules of

management business process systems using TML – process modeling language [6].

Research results. Taking into account Table 1 criteria of business process management-audit, TML-model (Fig. 1) is proposed as a complete

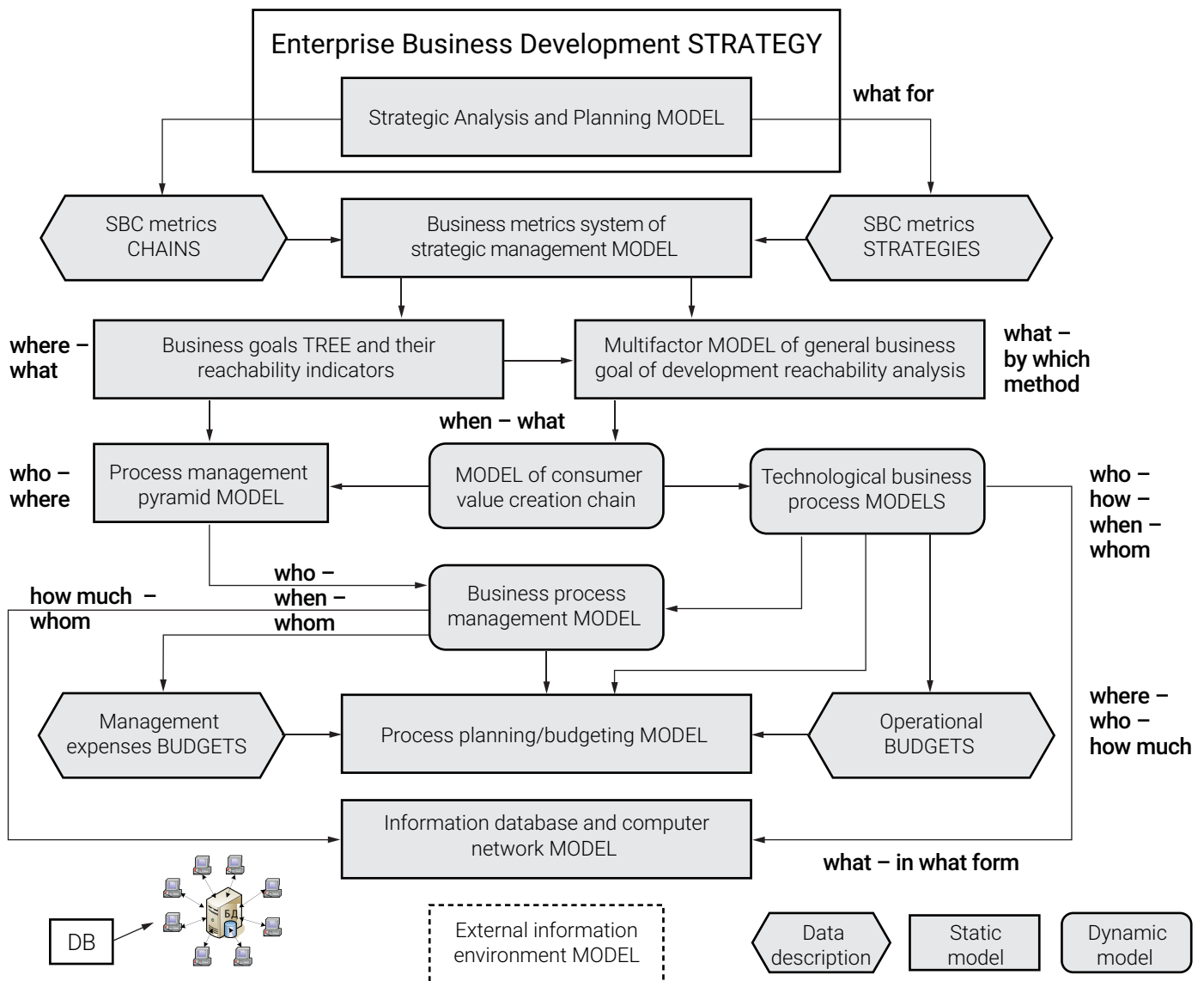


Fig. 1. Conceptual model of full object management-audit database of process-oriented enterprise (Tupkalo model)

database for enterprise business process system (conceptual model of enterprise management-audit object) allowing immediate violations (deviations) of business process detection [7]. This model considers one of the strategic management theories «fathers» Alfred Chandler’s statement «...structure follows strategy...» [10,11]. Herewith, controlling rules of static and dynamic models engineering/reengineering (Fig. 1) should be their appropriate composing rules.

It should be mentioned that model on Fig. 1 corresponds to known definition «complete business model of enterprise characteristic» [12, 13], which is explained as block of function-oriented informational models and provides receiving answers to the following basic group of interrelated questions:

- 1) on the matrix modelling stage: «what for» – «what» – «where» – «who» – «how much»;
- 2) on the dynamic flow modelling stage: «how» – «when» – «whom» – «in what form».

Consequently, authors recommend considering of the management-audit purpose on the process-oriented enterprise in context of three routine management problems solving:

- 1) performance indicators assessment of enterprise business process management system for achievement of set general (strategic) business goal, for example aiming to maximize economic added value;
- 2) «bottlenecks», such as various risks or business process drawbacks in operational activities detection for assessment and development of internal control mechanisms preventing or minimizing their influence;
- 3) making recommendations for process management system improvement in total, for example depending on cooperation strategy with external business society.

Commenting Fig. 1, it should be mentioned that proposed methods of management-audit and business

Marketing Mix Model (MM)		Economic policy (strategy) of interaction with the target market					
		1 Product	2 Price	3 Place	4 PR		
System of Business Coordinates (SBC)							
Economy / finance		1	P_{11}	P_{12}	P_{13}	P_{14}	Regional procurement policy
Market	Suppliers	2	P_{21}	P_{22}	P_{23}	P_{24}	Information influence on target market policy
	Customers	3	P_{31}	P_{32}	P_{33}	P_{34}	
Organizational Development	Business process system	4	P_{41}	P_{42}	P_{43}	P_{44}	Sales channel policy of organization
	IT-source	5	P_{51}	P_{52}	P_{53}	P_{54}	Internal informational policy
	Personnel	6	P_{61}	P_{62}	P_{63}	P_{64}	
			Recruitment policy	Financial policy of organizational development budgeting	Regional organizational development policy (strategy)		
			Remuneration and bonuses policy				

Fig. 2. Strategic planning matrix «SBC – MM» (author’s model)

process optimization are grounded on concept that business process system is subordinate function of enterprise business strategy and is system-forming instrument of management-audit development strategy for process-oriented enterprise and is strategic planning matrix «SBC–MM» [8] (Fig. 2) tested by the authors in many consulting projects.

Based on the aforesaid, the following authors definition is proposed.

Definition 1. Management-audit is the investigation of all categories (directions) of the enterprise operational activity according to the business metrics system of the enterprise oriented on creating recommendations on management practice improvement for those types of activities in which production costs reduction is possible.

Audit (management-diagnostics) objects of business-oriented enterprise should be considered as four groups (types) of the business process system according to the process management pyramid in model Fig. 1 and Definition 1 context. They are:

- strategic planning and marketing business processes;
- financial and economic management business processes;
- basic and ancillary operational activities management business processes;
- consumer business value creation technological business processes (Fig. 3).

Logical and procedural non-conformities, causing management system failures and enterprise insufficient performance indicators in records and document management systems detection are the main goals for complex management-audit of management business processes in four groups. So, record keeping should be analyzed in the following aspects:

- status and application of registration procedures in the system of internal document management and record keeping;
- status of documents flow instructions, conditions of their occurrence, archiving places;

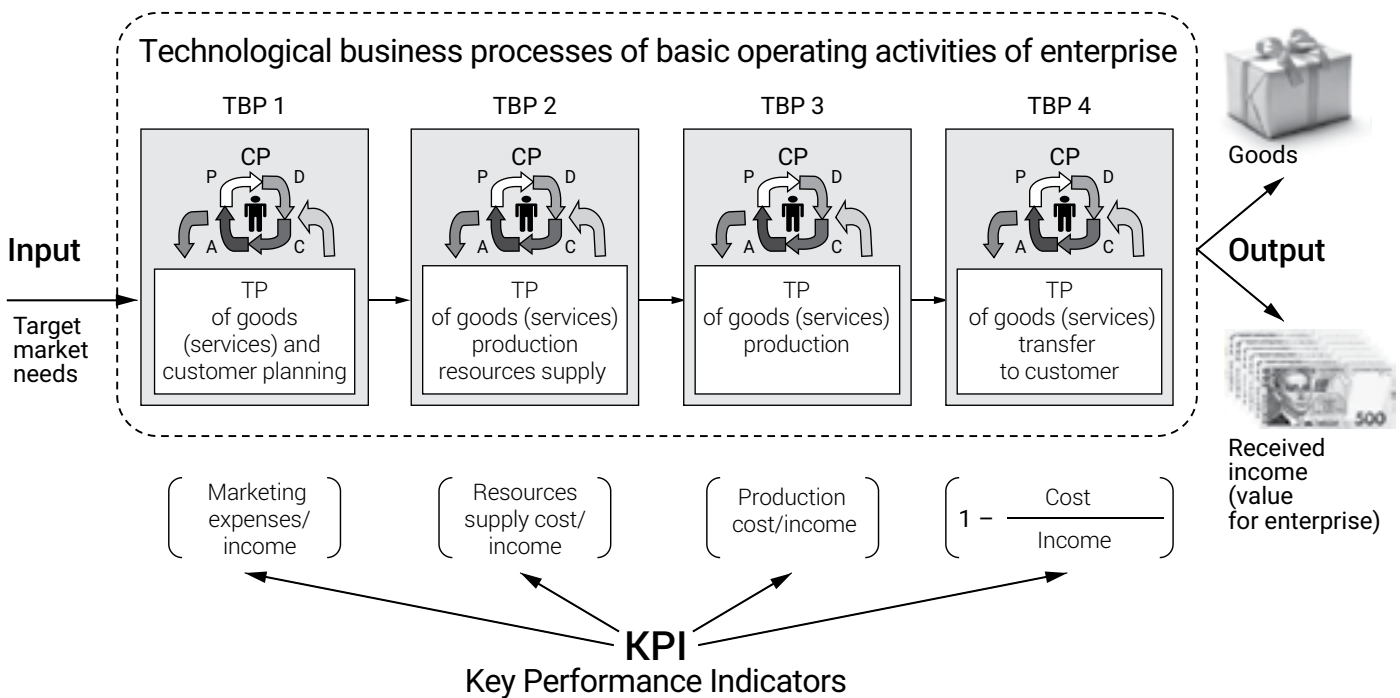


Fig. 3. Technological business process model of enterprise business value creation (author’s model [9]):
 CP – individual management process of the technological business process owner according to the PDCA «Plan-Do-Check-Act» management cycle ;
 TP – technological process of business value creation;
 KPI – Key Performance Indicators

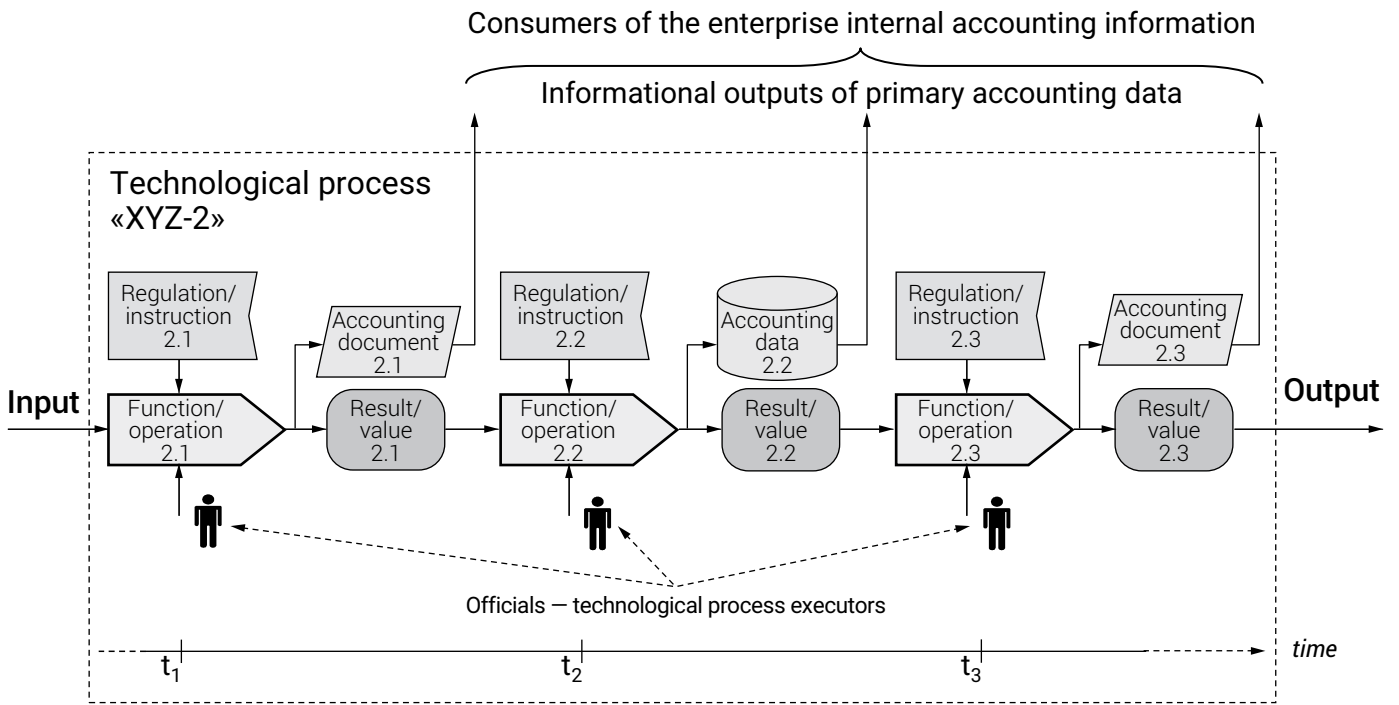


Fig. 4. Basic TML-model of graphic description of workflow models (TML-diagrams) technological process structure (author's model)

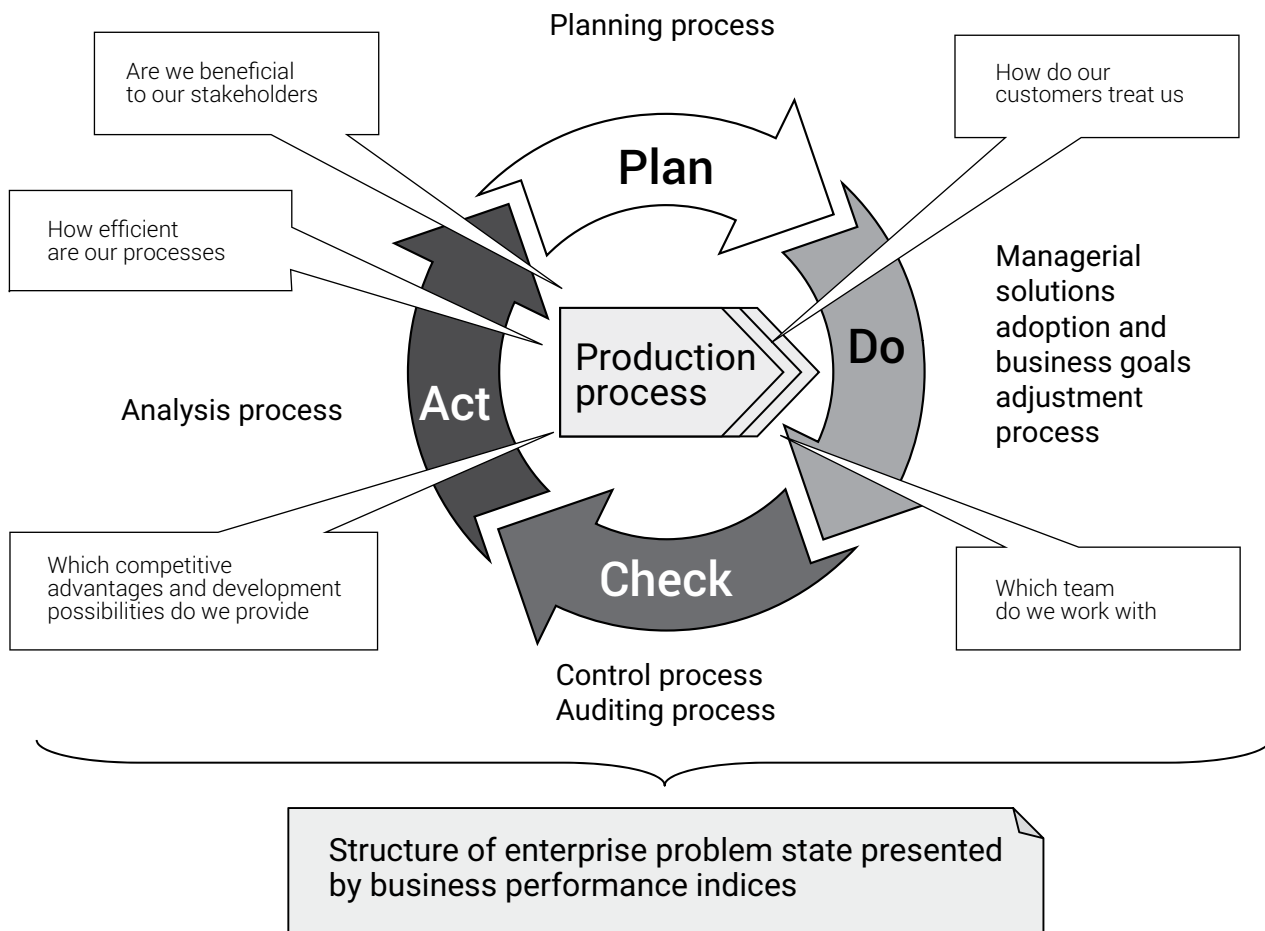


Fig. 5. Basic auditing questions system for production activities of the enterprise diagnostics (author's model)

- logical connections presence between data sources in the document management system and their significance (characteristics);
- managerial informational cooperation continuity chain (management record keeping) presence between managerial responsibility centers in separate branches of the enterprise process management pyramid.

Detecting and avoiding «interruptions» from officials liability continuity chain and detecting of informationally «silent» functional operations in TP and detecting opportunity of «interruptions» from informational responsibility continuity chain of TP officials are the main goals of second, third and fourth consumer business value creation technological business processes (Fig. 3) audit.

This complex business process audit goal can be achieved if each TP composition is provided according to Fig. 4 [6] model and answers to basic management-audit questions are received according to proposed diagnostics concept of enterprise production process on Fig. 5.

Taking into account this essence, the following definition is proposed.

Definition 2. Process-oriented management-audit is the business processes system of enterprise operational activity types investigation according to enterprise business metric system aiming at forming recommendations for changing the management practice by activities with possibility of increasing performance indicators, with main focus on business processes, which combine separate functions to corresponding chain of technological business process, creating enterprise business value (Fig. 3) [9] instead of focusing on functions provided by separate enterprise departments.

Thus, authors prove that according to Fig. 1 model the key advantage of process-oriented management-audit is its focus on development and strengthening of horizontal links between functional departments within the business value creation chain and vertical links between management responsibility within the enterprise process management pyramid (enterprise business metrics). In this case management-audit

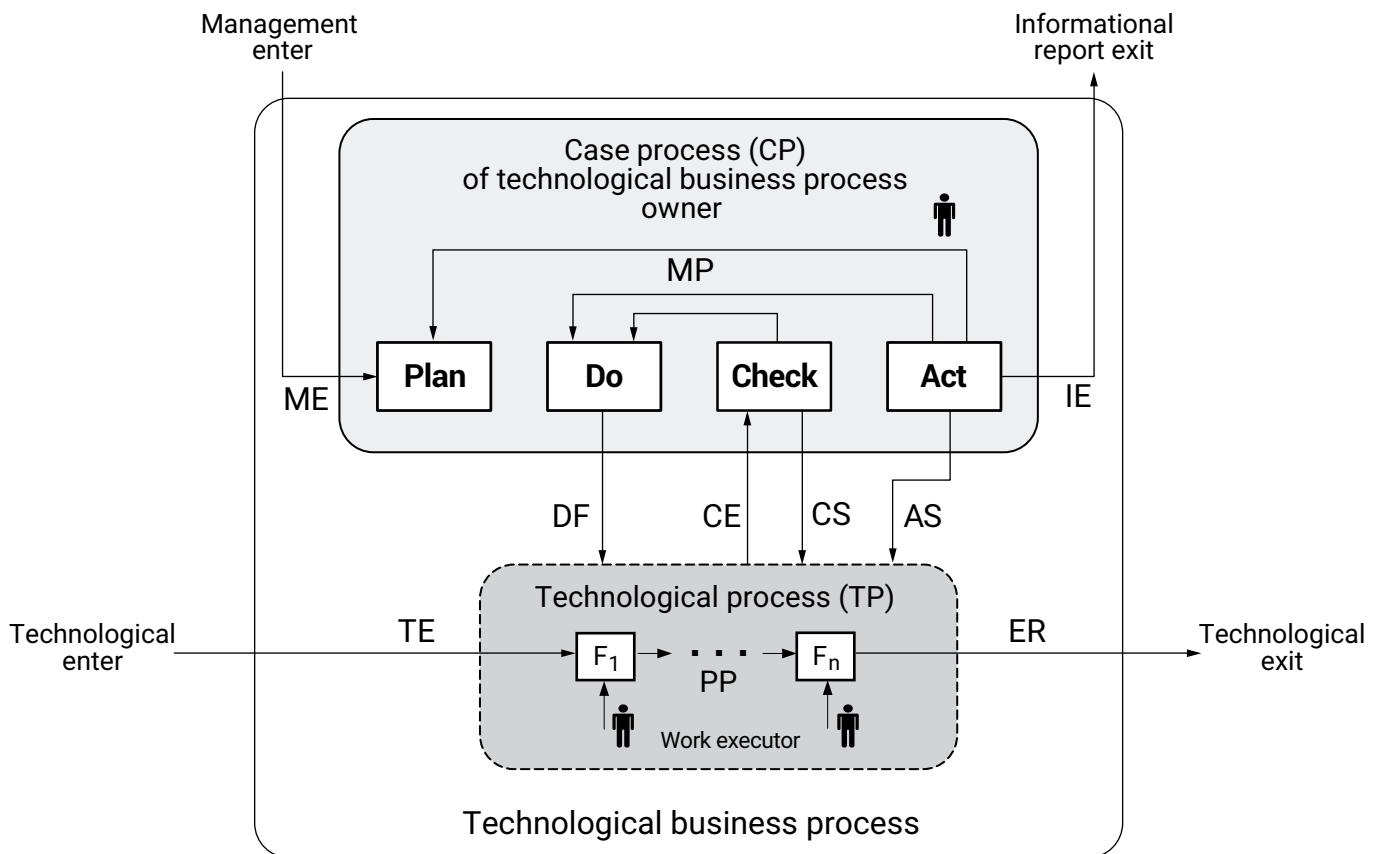


Fig. 6. TML-model for horizontal structural and compositional management-audit of TP (author's model)

of process-oriented enterprise should be concerned as complex audit in the spatial dimension, exactly:

- horizontal management-audit;
- vertical management-audit;
- direct management-audit;
- reverse management-audit.

The essence of these audit types is as follows.

Horizontal management-audit is separate technological (TP) or case process (CP) from its start to fi-

nish, omitting related processes. Detailed sequential check of each functional process operation is conducted within horizontal audit. Advantages of such an audit include the opportunity to check all process operations (actions), supporting documents, sources and personnel involved in the process functions in detail. TML-model for horizontal structural and compositional management-audit of technological business process (TBP) and case process (CP) of manager with business process owner status (Fig. 6 and 7), audit questions system of the Fig. 6 model is presented in Table 2.

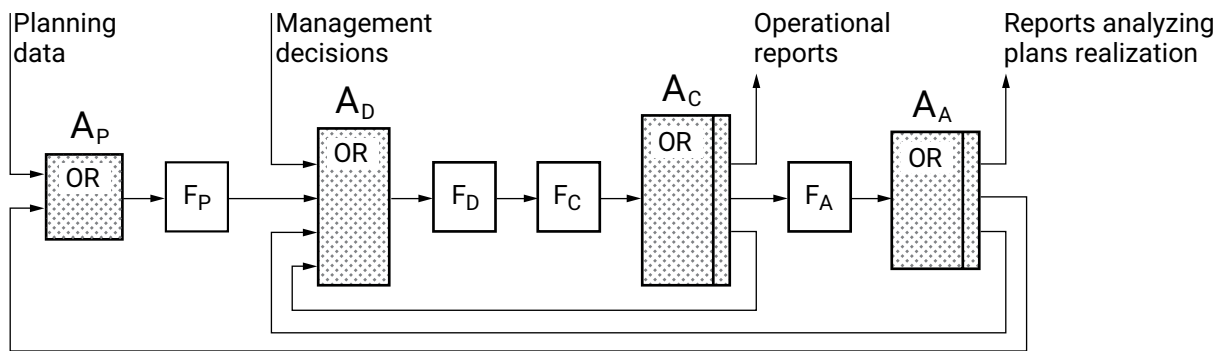


Fig. 7. TML-model for horizontal structural and compositional management-audit for case process of business process owner (author’s model):

F_p, F_d, F_c, F_a – functional operations of management cycle «Plan-Do-Check-Act»;
 A_p, A_d, A_c, A_a – logical operators (intersection) «OR»

Nº	TBP business link	Management questions chain	Management sense of TBP business links
1	ME	Who - when - what for- what - how much	TBP owner is asked questions who, when and which (what for) goal (what) and quantitative indices (how much) for its achievement assessment
2	MP	How - how much- what for	Which sequence of managerial actions (how) is necessary for TBP owner for quantitative indices achievement (how much) for TBP operational type goal achievement (what for)
3	IE	When - what - in what form	When, what, in what form reports-analyzes should be provided to TBP owner’s manager
4	DF	Whom - what for - what - how much	Whom (each TP executor) and which (what for) task (what) is set and which quantitative indices (how much) are used for its achievement assessment
5	CE	When - what - where - in what form	When, what and which actions (where) should be controlled and which reports (in what form) should be provided to TBP owner

Table 2. Audit questions system of horizontal structural and compositional audit-management of TP

6	CS	What for - what - when - whom - in what form	Which (what for) managerial decisions of TBP owner (what), when, whom (each TP executor) and in what form are provided
7	AS		
8	TE	Who - what - in what form - when	From whom (who) and what is the characteristics of the input flow (what), in what form and when should be provided for appropriate (product) consumer value creation
9	PP	When - what - who - how	When , which value (what) and who (each TP executor) and (how) in which sequence particular actions are provided
10	ER	When - whom - what - in what form	When, whom , created value (what) and in what form is passed

Table 2. Audit questions system of horizontal structural and compositional audit-management of TP (Continuation)

Vertical management-audit is structural and compositional audit of an enterprise business process system, which is provided according to all related technological process and case process of separate branches of the enterprise process management pyramid. Thus, if technological process or case process auditing identifies that any operation of this process

is associated with the operation of another process, then auditing expands to another process, etc. Advantage of this audit is that it allows checking all connections of processes and demand for inputs and outputs of processes. TML-model for vertical structural and compositional management-audit of processes adjacency is presented on Fig. 8.

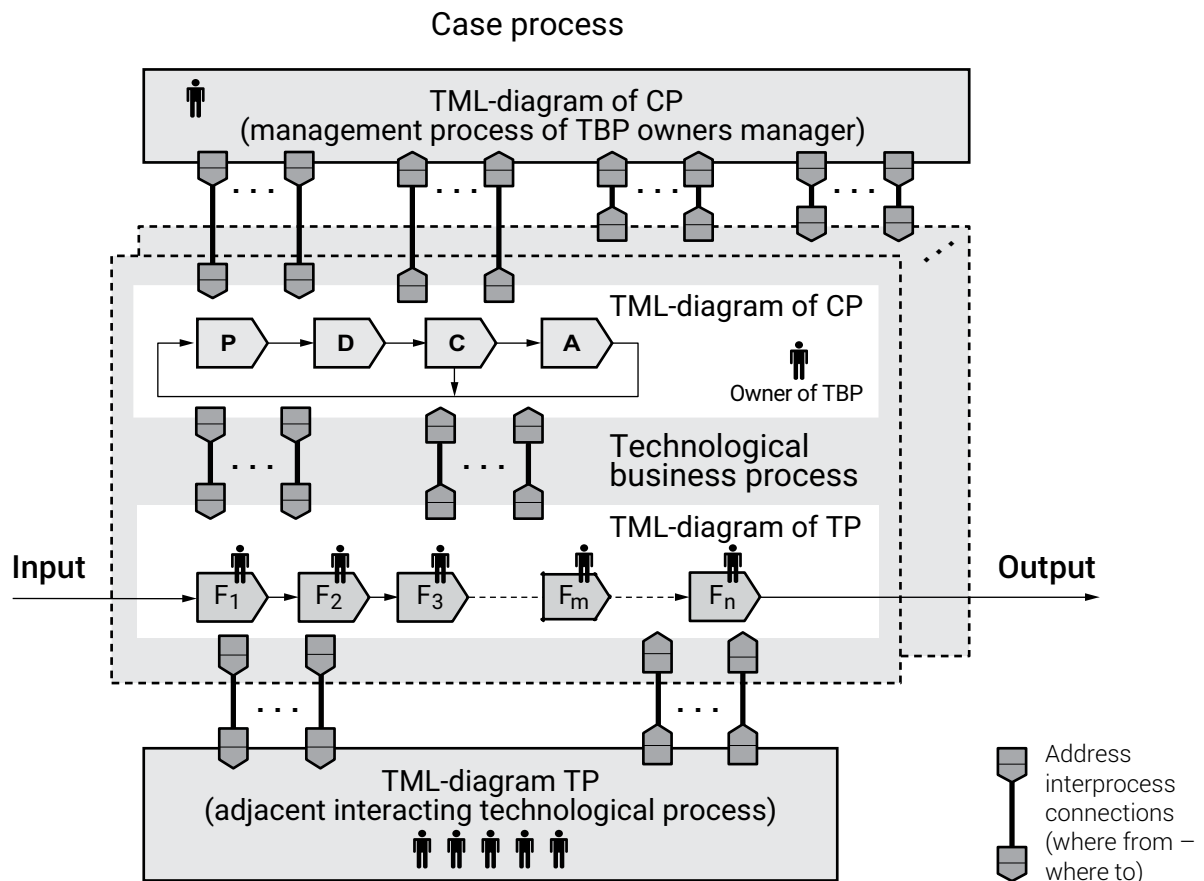


Fig. 8. TML-model for vertical structural and compositional management-audit of business process (TBP) (author's model)

Direct management-audit is the business process of value creation chain (business value) auditing from its beginning to the end of products or services launch. Audit starts from the first functional operation of the first TP and follows with sequential checking of its all functional operations. In case of connections of this TP with its direct manager CP or other TPs from the chain, then audit expands

to those related processes in part of operational relevance interaction control with this TP. Then the audit returns to the previous functional operation of the first TP. Advantage of this auditing method is completeness and expedience check of TP external operational connections, management performance indicators, implementation and maintenance. This management-audit example is presented on Fig. 9.

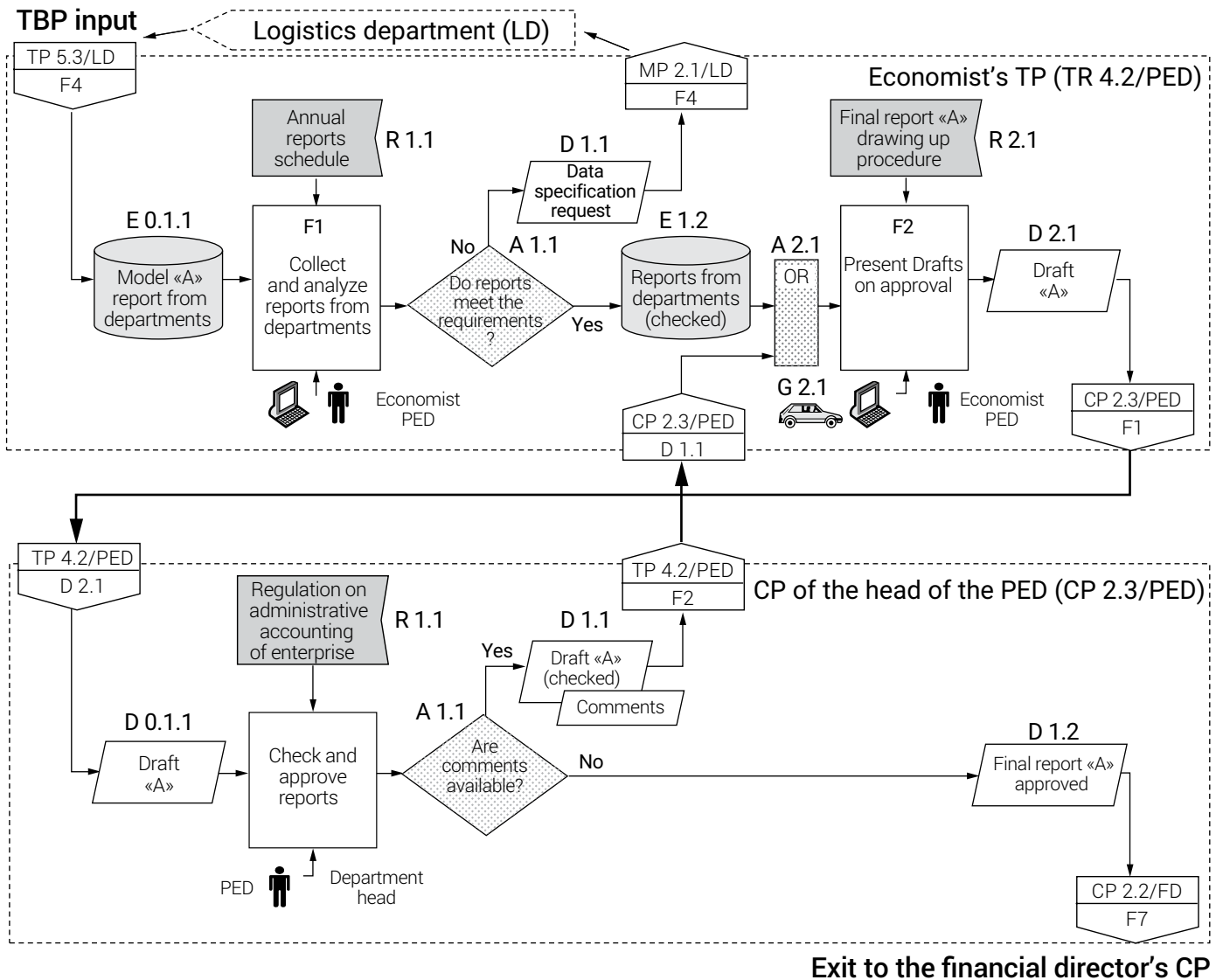


Fig. 9. Example: Management-audit of technological business process (TBP) «Final report by planning and economic department preparing» (TML-graphic model)

Reverse management-audit is the business process of value creation chain (business value) auditing for provided value creation actions check. Beginning for auditing is the moment of the whole chain work completion or products acceptance and following analyses of previous actions before

the work completion (products acceptance). This audit allows analyzing true work completed in chain processes, auditing and management documents (reports) appeared in the process of providing actions. Advantage of this audit is the opportunity for detecting informationally «silent» functional

operations in TP and detecting «interruptions» from liability and informational responsibility continuity chain of TP officials and finding non-conformities in accounting records which appeared as a result of operations. Authors made the following fundamental statement that such process modeling language should be used for visual (graphic) representation of the TP workflow model to provide the operational control (accounting) opportunity of commodity material values (CMV) movement along their route in production by creating materially liable persons chain.

Returning to the management-audit model object of process-oriented enterprise in terms of its dynamic components «technological business process model» and «business process management model» (Fig. 1), authors should mention the necessity for definition of particular rules for structural composing models of business process graphic (visual) representation. Authors propose the following definition of these rules essence regarding the chosen form of business process graphic (visual) representation.

Definition 3. Business process management-audit is its graphic representation conformity to set rules of graphic composition assessment in terms of corresponding business process modelling language use.

In terms of Definition 3 business process modelling language meaning coincides with authors defini-

tion [6]: TML process modeling language is systemic combination of the following three basic methods:

- business process based on SBC graph and informational and managerial value creation chain in the pyramid of process management;
- managerial business process composition method according to PDCA-diagram process management pyramid;
- technological (operational) workflow process composition method based on allocation of value creation chains for enterprise internal and external customers.

3. Conclusion

Scientific novelty of proposed scientific and methodological approach to creating management-audit method of process-oriented enterprise is based on conceptual author's model of complete database for process-oriented enterprise management-audit. Business process audit is defined as their graphic (visual) representation conformity to set rules of graphic (visual) composition assessment, which is accepted in the used author's TML business process modelling language. Further research prospects may be related to the set of basic rules development for structural and compositional business process system management-audit in terms of trend to modern management concept (model) – «digital (SMART) enterprise management».

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